Public Sector Value Analysis of
Boston-Logan International's Terminal B Parking Garage

Submitted to

Lowell L. Richards, III

Chief Development Officer

Economic Planning and Development Department

Massachusetts Port Authority

Advisor

Dr. Steven Kelman

Albert J. Weatherhead III and Richard W. Weatherhead Professor of Public Management

Kennedy School of Government

Harvard University

By

William Bryan Blew IV

2nd Lieutenant, United States Air Force

Karla Breceda Elenes

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"A relatively unglamorous side of the business it may be, but…parking is a stalwart earner that is ignored at an airport manager's peril."[1]

Executive Summary

The parking system at Boston-Logan International Airport may seem unglamorous to the average traveler, but for The Massachusetts Port Authority, its importance cannot be understated. Not only does the system provide a necessary service to great numbers of travelers every year, but also it generates income for MassPort that subsidizes many of its other activities.

Using Accenture's Public Sector Value Model, we analyzed the public value creation of Logan's Terminal B Parking Garage. We created three outcomes consisting of three metrics each in order to conduct our analysis. Then, we used those outcome scores as the Y-axis and cost effectiveness as the X-axis in order to plot the results on a 2 X 2 matrix depicting public value creation.

The garage services about one million customers per year and generates roughly $20 million dollars annually. However, four of the last five years have not produced the type of value creation necessary for the garage. While the events of 9/11 clearly had a negative effect, as they did on all airports, the biggest concern for this garage is its reaching of full operational capacity. Our analysis showed that the garage has overextended its operational capacity. Because it has reached capacity, the garage's management can no longer realistically hope to significantly increase outcomes, and as costs inherently rise over time, lower and lower PSV scores will result. Each week brings more and longer closures, a larger parking gap, more revenue lost to damages, and lower customer satisfaction, while exits do not increase. Management will be unable to compensate for the higher costs because they will have few options by which to increase revenue. Since exits cannot increase, the only way to increase revenue is through an increase in rates, which is neither easy to implement or satisfactory to customers. Therefore, MassPort must consider options by which it can increase capacity and product offerings for Terminal B parking customers.

[1] "The Friendly Face of Parking." Airport World. Aug-Sept, 2003. p41.

Historical Context

The Massachusetts Port Authority

In 1956, the state legislature created The Massachusetts Port Authority (MassPort, or the Authority) to control and manage Boston-Logan International Airport (Logan), the Port of Boston, the Tobin Memorial Bridge, and later Hanscom Field and Worcester Regional Airport. MassPort was created as a "quasi-public" agency that "shall not be subject to the supervision or regulation of the [state] department of public works or of any department, commission, board, bureau or agency of the Commonwealth."[2] Because MassPort receives no state tax funds, it must be self-supporting through "revenue bonds, bridge tolls, parking and aircraft landing fees, tenant rents, and concession fees."[3] The fact that MassPort must sustain itself without the help of the state government puts it in a position dissimilar from many other transportation agencies. For this reason, MassPort has many concerns other state agencies do not.

MassPort's defines its mission as the following: "to enhance the economic growth and vitality of Massachusetts and New England by the safe, secure, and efficient operation of the region's most important transportation facilities."[4] In order to fulfill its mission in the realm of air travel and shipping, MassPort operates Logan Airport. The aviation department of MassPort runs Logan, while the Port of Boston and the Tobin Memorial Bridge each have their own departments within the Authority.

Not only does Logan's complex organization operate the arrival and departure of commercial passenger aircraft, but also concessions, parking, land management, capital projects, commercial shipping, and terminal management all fall under the responsibility of MassPort.

More so than in almost any other industry, the horrific events of September 11, 2001, changed the business of aviation forever in two significant ways. First, passenger security became even more important than it already was. In effect, the security of the passengers, employees, aircraft, and entire airport became the only concern.[5] Second, due to the economic downturn that severely affected the aviation industry directly after the attacks, the business model of airports required adjustments. The Boston Herald reported the following:

[2] Qtd. in http://www.aapa-ports.org/pdf/governance_uscan.PDF
[3] http://www.massport.com/about/pic/c_admin_stat.pdf. Accessed January 25, 2005.
[4] Ibid.
[5] Security will be covered more in depth at a later point in the paper.

> "[MassPort] is losing $300,000 a day in the wake of the Sept. 11 terrorist attacks. Every 747 that's not landing at Logan International Airport is $1,400 down the toilet. Some 3,000 parking spaces – at $18 a day – have been wiped from the Logan map because of security concerns. And the sunken demand for parking alone – daily parkers are down from 10,000 to 4,000 – accounts for nearly $110,000 in lost revenues every 24 hours."[6]

Not only was MassPort experiencing economic difficulties, but also they encountered both public image and employee morale problems. Despite the fact that employees contracted by the airlines and under control of the FAA screened all passengers at security checkpoints, the public began to criticize the agency because two of the hijacked planes originated from Logan. "As the condemnations poured in from the media, local politicians, and the public at large, the morale of [MassPort's] workforce plummeted."[7] Furthermore, "the media and the public became especially critical of the fact that a number of management positions at [MassPort] had been filled through political patronage."[8]

In the 11 years before 2001, MassPort employed four different executive directors, each with little or no experience in the transportation industry but significant political backgrounds. In fact, in a newspaper story about Virginia Buckingham, MassPort's executive director from 1999-2001, the author wrote, "[Buckingham] has no aviation or transportation background, but has one key attribute amid the glaring lack of qualifications: political loyalty."[9] Dave Mackey, Chief Counsel at MassPort, when asked about the atmosphere before September 11, 2001, recalled, "It was a very political environment."[10]

The situation at MassPort changed appreciably when the Board of Directors hired Craig Coy on April 11, 2002. The Boston Herald reported the hiring as follows:

> "The MassPort board made its boldest attempt yet to break with [the] past by naming Coy as the agency's new executive director. The most impressive part of his resume is what he ISN'T. He isn't a political operative. He didn't work on anyone's campaign. He isn't an insider. But is he what the agency has long needed – a competent

[6] Qtd. in "Massport (A): The Aftermath of 9/11." Michael A. Roberto and Erika M. Ferlins. Harvard Business School Case N9-304-081. March 11, 2004.
[7] Ibid.
[8] Ibid.
[9] Ibid.
[10] Ibid.

> professional with private sector and public safety experience and, most of all, a fresh perspective."[11]

Coy's predominantly private-sector approach focused on three issues: authority, responsibility, and accountability. To change the direction of the agency, he restructured MassPort internally by redefining each operating unit (aviation, maritime, and the bridge) as profit centers. Furthermore, his team developed financial and non-financial metrics to track the performance of each business unit and support function. Though it took employees time to adapt to MassPort's new way of doing business, Coy's introduction of private-sector ideas pushed the culture in exactly the right direction at this most critical point in time.

In the new economic environment, most airports could no longer count upon outside entities to continue supporting the airports. Whether a particular airport previously survived on surplus tax revenue or the economic advantages of a thriving national aviation industry, airports quickly realized that survival now meant self-sufficiency. This new requirement put many airports into the difficult position of being a self-supporting entity without the opportunity to compete in a private market. Therefore, airports began searching for creative ways to maximize revenues and continue operations. Many found that parking would have to be their new source of income.

Why Parking?

- Before 9/11, the parking system was a necessary service to the public that coincidentally created net revenue to support airport operations. With current passenger levels still below 1999 levels, reduced concession revenue, and dramatically increased security costs, airports must take a new look at parking. [12]
- Airports have come to recognize that parking is an important revenue source that helps to defray the costs of other projects that cannot be covered by grants or bonding.[13]

[11] Qtd. in "Massport (B): Change at the Top." Michael A. Roberto and Erika M. Ferlins. Harvard Business School Case N9-304-097. March 17, 2004.
[12] Butcher, T and M. Smith, Market Focused Parking products at Airports ,*Parking Today*, April 2003.
[13] Maximizing Parking Revenues, Minimizing Risks, *Airport Management*, January 2001.

Furthermore, in the case of MassPort, parking revenues subsidize other areas of operation – most notably, the Port of Boston.

- Parking constitutes one of the only major airport components upon which airport management has a wide span of control. Unlike other areas of operation, MassPort employees control most every aspect of product delivery from supply to price to customer service.
- If an airport's parking system is not well managed - in terms of service and finances - the public often perceives a failure of airport management.[14] Simply put, parking is the face of the airport to many citizens and customers.

A Note About Security

MassPort, and the airport in particular, cares about nothing more than the safe travel of passengers and cargo through its facilities. In fact, the new Terminal A houses the nation's most state-of-the-art airport security facility. In his letter posted on the MassPort website, Coy writes, "MassPort…will continue to work closely with our partners in the Transportation Security Administration, and other security experts, to improve security at all our transportation facilities. Your safe and secure travel experience is, and will always be, our top priority."[15] Because the Public Sector Value Model places relative weights on desirable outcomes for MassPort, it cannot possibly capture the importance MassPort places on security. If the model were to include security, it would be weighted as 100 percent while all other outcomes would receive zero percent of the weighting. Therefore, because security concerns pervade every aspect of MassPort's operations and unilaterally outweigh all other outcomes, our model does not include any analysis of MassPort's security operations.

Benefits to MassPort

MassPort can expect to receive an in-depth analysis of where it currently stands with regard to the Terminal B Garage. We will illustrate to them how they have created value in the

[14] Maximizing Parking Revenues, Minimizing Risks, *Airport Management*, January 2001.
[15] www.massport.com/about/about_ceole.html. Accessed March 19, 2004.

past and how they can increase their opportunities to do so in the future. The final PSV analysis will primarily be a tool to analyze the revenue generating capacity of Garage B from the citizens' perspective.

Benefits to Accenture

Because Accenture has given us access to their expertise and training on their model, it is important they receive a return on their investment. We hope their government sector practice gains two primary benefits from our work. First, as Accenture continues to try to enhance the recognition and reputation of their PSV model, we hope we further their efforts. For each time the PSV is successfully applied to another agency, its reputation as a valuable analytical framework increases. Therefore, we expect our work to give them another example of a successful application of their model.

Furthermore, our work applies the PSV model in ways not previously used. Not only is this the first time the model has been applied to an agency that is only "quasi-public", but also this is the first time the model has been used to analyze any part of an airport. These new applications of the model give Accenture both knowledge about the flexibility of the model and a new way to market and sell the model.

In addition, because the model has yet to be used for a "quasi-public" agency, we intend to point out ways in which the model can be adjusted for this specific use in the future. Our difficulties with the model and feedback about it to Accenture, gives them first-hand knowledge of some of its limitations without having to use the valuable time of full-time consultants to gain these insights.

Airport Parking Literature Review

As noted, the strategies used by airport parking managers have changed drastically since 9/11. In an article about the future of airport parking, Steve McCormick of Central Parking System, one of the country's largest airport parking operators, said, "There was a time when airports needed off-airport parking to supplement their on-site parking – that's all gone away.

You are seeing operators for the airports beginning to develop marketing programs and ideas to bring people back on-site for parking."[16] For instance, as a result of "an exhaustive marketing campaign,"[17] Dulles Airport enjoys a pay-on-foot utilization rate of 60 percent after only one year of the program.

The article also noted that "few airports are passing up the chance to upgrade, improve, and renovate their parking operations. For airports, the improvements should yield better revenues even with current traffic levels, and will reap the rewards should traffic pick up anytime soon. For customers, the improvements are often instant, and warmly welcomed."[18] These upgrades in parking operations relate primarily to the use of new technologies now available to parking system managers. While many airports offer an online reservation system, some are beginning to add an automatic vehicle identification system that allows parkers to come and go without stopping upon entry or exit. With some interagency cooperation, passes used to park at an airport could be linked to turnpike passes like FAST LANE.

Several other technological advances in parking systems might be off particular interest to MassPort and the parking operators at Logan:

- Smart-Park at Baltimore-Washington International: sensors in each parking bay communicate with signs that direct parkers to open spaces.
- ParkNet: similar to Smart-Park; it directs parkers to available parking spaces based upon pricing options, length of stay, and availability.
- ParkStat: it uses actual ticket data to take the guesswork out of optimizing rates and reducing staffing costs; ParkStat constructs scientific models to calculate an infinite number of rate structures with varying price and time increments, enabling the customer to have the best information and making rate structure changes that will maximize revenue.

While MassPort has begun to institute new products and technologies in their parking garages, these ideas, and others like them, go beyond MassPort's current offerings. Systems like these would not only increase revenue in the parking garages, but they would also maximize the customer experience when parking. Therefore, it is important for MassPort to keep them in mind as they go forward.

[16] Qtd. in. "The Friendly Face of Parking." Airport World. Aug-Sept 2003, 41.
[17] Ibid, 42.
[18] Ibid.

The Logan Airport Parking System

Mission and Objectives

MassPort's overriding ground transportation goal is to provide a diverse range of ground access options for air passengers, airport employees, and other airport users to reduce reliance on single occupant vehicles, and maintain good transportation and parking services in and around Logan Airport. MassPort's ongoing ground access planning goals focus on ensuring that a wide variety of effective and convenient travel options are made available to and from Logan Airport in order to provide all of Logan's customers with reliable, economical, and environmentally responsible alternatives to single occupant vehicle use. MassPort promotes and supports public and private High Occupancy Vehicle (HOV) services aimed at serving air passengers, visitors and employees. While private automobiles, taxis and rental cars involve many HOV trips, they are not categorized as HOV modes.[19] To address the impacts associated with the major users of Logan's ground access system, parking facilities, and transportation infrastructure, Massport has promised to increase ground passenger HOV mode share to 35.2 percent by the time Logan Airport handles 37.5 million annual air passengers (in 2003 there were about 22.8 million annual air passengers).

According to the 2003 Environmental Data Report (EDR) "MassPort manages its parking supply at Logan Airport to promote long-term parking rather than short-term parking; to support efficient parking utilization; and to conform to the provisions of the Logan Airport Parking Freeze." [20]

However, the need for curbside security restrictions on parking has made it necessary for MassPort to continue decreasing its parking rates for short-term parking to accommodate pick-up and drop-offs.

Policies: HOV, Parking Freeze and Revenues

MassPort faces the challenge of maximizing parking revenues while adhering to its ground transportation and parking missions. Before 9/11 MassPort's attitude towards parking

[19] 2003 Environmental Data Report (EDR).

[20] Limits on commercial parking spaces at Logan Airport are governed by the Massport/Logan Airport Parking Freeze (310 CMR 7.30) and the City of Boston Parking Freeze (310 CMR 7.31), which are elements of the Massachusetts State Implementation Plan (SIP) under the Federal Clean Air Act Amendments (CAAA). Ibid.

was mainly determined by the authority's commitment with the neighboring communities to reduce traffic. After 9/11 MassPort's financial constrains forced the authority to change its attitude towards the parking system. In particular, MassPort's response to unmet parking demand is a clear example of this change of attitude.

For more than three years before 9/11 Logan offered significant discounts for its HOV ground transportation services during high seasons to prevent people from driving and specifically parking at Logan. But faced with a new financial scenario, MassPort is now trying to accommodate the excess parking demand—both during normal and high seasons. Discounts are no longer offered during the high seasons instead, fares have gone up, fares have been modified to increase revenues and new parking products and services are being offered to attract more travelers.

Despite these recent efforts to increase parking revenue, MassPort has adhered to its initiative to increase HOV share of ground transportation and has kept the number of commercial parking spaces below the limit set by the Parking Freeze.

Management and Parking Demand

Four main facilities make up Logan's parking system: the central parking garage (Central), the parking garage in Terminal B (Terminal B), the parking lot near Terminal E (Terminal E) and the Economy lots away from the Terminals (Economy). Additionally, in the most recent years non-parking facilities have been implemented as overflow lots to meet the growing parking demand.

For 2003 only 15,317 spaces out of the 20,692 spaces allowed by the Parking Freeze were in service. This comprised 12,220 available commercial spaces and 3,097 available employee spaces. Similarly, in 2002 there were 12,404 available commercial spaces and in 2001 there were12,114 commercial spaces. The 15,467 commercial parking space limit set by the Parking Freeze was not exceeded at any time during the past three years.

On-airport commercial parking occupancy typically peaks mid-week (Tuesday through Thursday), with significantly lower occupancies on other days. Peak parking occupancies also

show wide variation on a weekly basis, with the weekly peak occupancy ranging from 5,101 to 12,031 vehicles in 2003, a difference in the order of 6,930 cars.[21]

Parking Challenges

Is Logan optimizing this key revenue source?

While most large hubs have a great number of connecting passengers, Logan passengers aren't just changing planes; 90% of Logan passengers start or finish their journey here. Nearly every person who arrives at Logan has chosen Boston as their destination.[22] Thus Logan's parking revenues should be increasing as the number of enplanements increases.

In the wake of 9/11, off-airport operations have become even more aggressive about gaining market share. While airports have had many issues to deal with, off-airport parking operations have only one: attract parkers to stay in business.[23]

Is Logan responding to citizens needs?

This double-edged question is at the heart of parking operations at MassPort. In the most macro, basic sense, the parking garages do provide customers with places to park their cars and ways to access the terminals. The problem is that the answer is not quite that easy.

The parking system at Logan exists for two primary reasons: to provide places for customers to park and to generate revenue for the sustainment of MassPort operations. From the revenue generation perspective, MassPort would like to charge prices that maximize customers' willingness to pay; however, in the case of Terminal B, because it caters mostly to business travelers who pass costs along to their clients/companies, price increases would probably create too much of a public relations disaster before business travelers would stop using the garage.

Customers who do not or cannot pass costs along also use the garage. In this case, the balance is much more delicate. MassPort still needs the revenue generation, but it must not raise the prices so high that a more "average" person can no longer afford to use the facilities.

[21] 2003 EDR.
[22] Future of Boston, Advertisement Supplement to the Boston Globe.
[23] Maximizing Parking Revenues, Minimizing Risks, *Airport Management*, January 2001.

Therefore, while we cannot help but answer "yes" to the above question, MassPort must remember that its business-like approach to parking must not overshadow its mission to serve the public as an airport and a reasonably-priced parking garage.

Is Logan tailoring parking options to customer needs?

The traditional view of airport parking is based on length of stay: long-term or short-term. The first paradigm shift is to step back from this viewpoint and take another look at what really drives customer choices. From a marketing perspective, trip purpose gives more illumination of wants and needs than simply length of stay. This approach leads to the development of more parking products to serve user needs at differing price points. The following are different types of parking customers:

- **Meeters, Greeters and Well-Wishers**

  These parkers are primarily concerned with convenience and ease of way finding. They typically stay a short time, may be unfamiliar with the airport and may come from a greater distance than the typical business parker. They pay relatively small parking fees and thus typically pay by cash. The parking fee is not important in their decision to park in the closest available parking location so long as that rate is not out of line with local norms. They truly are a captive market for airport parking.

- **Business Travelers**

  The vast majority of parkers who stay four hours to three days are business travelers. Many business travelers use credit cards rather than cash. Within the business traveler category there are three parking subgroups.

  - Premium. Those who are not rate-sensitive, and will pay a premium price for convenience and service.
  - Economy. Those who are primarily rate-sensitive and will choose either on- or off-airport parking that is positioned as an economy product.
  - Standard. Those in the middle of the market, who are value-conscious and balance price with convenience.

- **Leisure Travelers**
  - Leisure travelers are primarily interested in economy, with speed and convenience being lesser concerns. They typically stay the longest, are the most likely to be rate-sensitive and the most likely to choose economy parking (either on- or off-airport).[24]

Is Logan balancing demand among the available parking lots?

By its own admission, MassPort knows that it could do a better job of directing traffic to the correct parking lots; the "correct" lots would include those with open spaces nearest your departing terminal. Without the proper information technology, it is difficult to perform this task efficiently and effectively. The airport parking literature review section of this document includes ideas about how to do this.

Some discussion at MassPort has focused around the usefulness of dynamic pricing as a market-based way to direct customers to the correct lots. A solution like this would require great amounts of short-term capital investment and annoyance, but the long-term benefits would presumably lead to higher revenues and better customer experiences.

Whether or not dynamic pricing is the answer, anecdotal data suggests that Logan's parking, on the whole, is a fairly inefficient process that does not fully balance demand between the lots. For instance, in order to cater to certain customers, MassPort uses techniques called "stuffing" and "stacking." Both techniques require more staff and lead to more damaged cars. While this problem may not be completely avoidable, a system that could get customers to the correct lots could help alleviate the situation.

It is important to note here that MassPort is currently undertaking a major capital project in Central Garage that should provide long-term solutions to many of the parking concerns.

Is Logan concerned about citizens' perception?

The executives at MassPort/Logan are clearly concerned about the public's perception of their operations. We have seen public perception play a vital role in decision-making at the highest levels. However, this is a noted departure from the role it played in the past. The public's perception of MassPort operations currently plays a constructive role without being the primary focus.

[24] Butcher, T., and M. Smith, "Market Focused Parking Products at Airports," *Parking Today*, April 2003.

With regard to parking, MassPort takes environmental concerns very seriously. MassPort's annual Environmental Data Report analyzes the cumulative effects of Logan's operations and activities. For instance, MassPort is very committed to achieving its stated High Occupancy Vehicle goals for the airport. In environmental concerns and in many other arenas, MassPort considers its public image and the public's perception of it as important allies.

Methodology

The Public Sector Value Model[25]

Private sector companies measure performance in a relatively easy and uniform manner. The companies might use profits, market capitalization, earnings per share, return on equity, or a number of other tools to measure performance over time. However, for many reasons (i.e. no standard definition of value, no competition to drive performance, and no standard market for information) the public sector has no comparable tools to measure overall performance. Public sector organizations may focus on decreasing costs, increasing revenues, or improving service, but no comprehensive measurement tool previously existed. Therefore, Accenture created the Public Sector Value Model (PSV) to measure the value creation or value destruction of a public agency.

The PSV, while taking into account the purpose of public organizations, uses objective measures to analyze whether a particular entity is delivering value to its respective citizen/customer base. In order to contribute value, the PSV models calls for an organization to deliver more highly favorable outcomes to stakeholders at less cost per outcome. To do this, the model measures the public organization's outcome performance relative to the costs associated with achieving those outcomes. To illustrate value creation or destruction over time, each year's "score" (outcomes versus cost effectiveness) must be plotted on a 2 x 2 grid, with the X-axis representing cost effectiveness and the Y-axis representing outcome performance. This trendline, over time, shows the value creation or destruction of the public entity.

Because the accuracy of the final analysis rests largely upon the outcomes and associated metrics chosen, each must be selected carefully. In order to choose an appropriate outcome, one

[25] The Public Sector Value Model is proprietary information developed and used exclusively by Accenture. All of the authors' knowledge and information about the PSV comes from training presentations and sessions with Accenture employees.

should examine the end result of an organization's operation, and one should build outcomes around the organization's primary core activities or endeavors. Furthermore, appropriate outcomes must represent the citizens'/customers' expectations. Outcomes should characterize actions, that when completed successfully, particular stakeholders perceive value creation. Because the PSV is only a model, one cannot expect it to encompass every output of an agency; it is meant, instead, to highlight the most important of the entity's outcomes.

Outcomes are quantified by the measurement of key performance metrics relating to that outcome. These metrics, when performed well, should lead to the achievement of the outcome. In order to ensure that the selected metrics will yield the anticipated results, one should apply a filter to each one. The metric must meet seven conditions; the metric should be as follows:

- *Outcome-focused*: metrics must reflect the agency's mission and priorities; they must enable evaluation of the agency's effectiveness in achieving its goals
- *Citizen-centered*: metrics must track and measure what constituents and stakeholders value; they should reflect the "end-product" that customers see
- *Comprehensive*: metrics, in the aggregate, should give a holistic picture of agency performance; they should reflect the agency's core function and processes
- *Balanced with Efficiency*: metrics should drive efficiencies within the agency
- *Measurable*: metrics should be measurable, well-defined, and linked to outcomes
- *Feasible*: data for the metrics should be available and easy to gather
- *A Driver of the Intended Behavior*: metrics should limit unintended consequences

After the appropriate outcomes and metrics have been decided upon, they must each receive a corresponding "weight". These weights allow the analysis to reflect the relative importance an entity places on different outcomes and metrics. In our case, the outcome and metric weights will be determined exclusively by the client.

In order to ensure the accuracy of the analysis, all outcomes and metrics must be standardized and normalized. Standardization must occur in order to ensure that data within a particular outcome can be compared across different years without biases. If using the PSV as a benchmarking tool, this also allows for the comparison of data across organizations. In this

analysis, standardization simply means using percentages rather than absolute numbers in the PSV model.

Normalization ensures the ability to add metrics on a "like by like" basis, resulting in an accurate, comprehensive final outcome score. It involves a common denominator for each metric, allowing for the total outcome score to be calculated more simply. To normalize an outcome score, one must compare each score to a fixed value. We will use the following formula: normalized score = outcome score / average of all outcome scores. This ensures a set of scores that fluctuate around the value of 1 and means the exhibited values are in relation to the average of the data set.

As previously mentioned, the PSV model depends upon both an agency's outcome score and its cost effectiveness score. Cost effectiveness measures the achievement of outcomes per resource employed to produce them. These resources employed will be normalized around the amount of average resources employed. To calculate cost effectiveness, we will use the following formula: normalized outcomes / normalized cost.

In a typical PSV analysis, cost is defined by the following formula: cost = (total annual expenditure – capital expenditure) + capital charge. The annual expenditure (i.e. operating expense) consists of the annual operating costs that are used to generate the outcomes. The capital expenditure figure represents the total amount of the organization's capital expense for the year. Finally, the capital charge represents the opportunity cost of holding capital that could be used elsewhere within the organization or public sector. The formula normally used is as follows: opportunity cost = (cost of capital) * (total assets – current liabilities).

For the analysis of Parking Garage B at Logan, we used a slightly different cost formula, represented by the following: cost = annual operating expenses + annual cost of capital. Then, the total cost figures were adjusted for inflation. We measured costs in this manner because it better reflects the way MassPort accounts for its costs.[26]

Once the final outcome and final cost effectiveness scores are found, the model calls for them to be plotted on a 2 x 2 grid. The outcome scores are plotted on the X-axis, while the cost effectiveness scores are plotted along the Y-axis. Each year receives its own data point on the

[26] To measure capital costs, we examined all the capital projects on Lot B's "books" during our period of analysis. We then calculated the amount to be amortized per fiscal year for each project.

graph, and the trend over time represents either the value creation or value destruction of the agency. A move toward the upper right-hand (northeast) quadrant represents a value-creating trend, while a move toward the lower left-hand (southwest) quadrant depicts a value-destroying trend.

The PSV model enables one to conclude a great deal about the performance of an organization, and it gives an idea about the actions that have led to that performance. However, some important abstractions have been made in the model's development that should be kept in mind at all times. First, the public sector is filled with multi-causality, and one should keep from assuming that one model could capture all of the forces and pressures affecting a public entity. Second, many exogenous factors exist that can lead to changes in performance (for example, an election resulting in the change of an administration or the introduction of a new performance management system). These exogenous factors should be mentioned in the analysis in order to help explain relative changes in overall performance. Third, the PSV is relative; it is not absolute and should not be used as such. Finally, it is important to keep in mind that the PSV models outcome performance against an agency's total cost.

Cost Effectiveness versus Cost[27]

Several questions have arisen about Accenture's (and thus our) use of the term "cost effectiveness." While the term "cost" measures simply the amount of money spent by an organization in order to produce and/or deliver its good or service, "cost effectiveness" measures cost per unit of outcomes. Therefore, an agency can increase cost effectiveness in one of three ways: 1) increasing outcome achievement while holding cost per outcome constant; 2) decreasing cost per outcome while holding outcome achievement constant; or 3) increasing outcome achievement and decreasing cost per outcome.

[27] We consulted the Policy Analysis Exercise of Hien Dao and Sondra Roeuny for parts of information contained in this section.

Using the PSV to Analyze Logan's Parking System

Overview and Assumptions

As previously mentioned, Logan´s parking system consists of several lots, where the Central Garage serves as the main parking lot for all terminals. Initially, we intended to analyze the parking system as a whole; however, the Central Garage is currently undergoing several capital projects that were difficult to accurately incorporate into the PSV methodology. Thus, we decided to focus our analysis on Parking Garage B.

Garage B serves as Terminal B's—the airport's busiest terminal—independent parking garage, although it also offers access to Terminals C and D. It has 2,692 spaces among five levels and is surrounded by Terminal B—with American Airlines on one side and US Airways on the other. Since Terminal B and its parking garage can be thought of as an independent small airport, we expect MassPort to use our model to later analyze the performance of the Central Garage and the whole system, including satellite lots.

We hope that developing this model for Garage B will help MassPort identify those aspects of the parking system that must be regularly measured in order to guide its parking managers toward value creation.

The five time periods we analyzed go from fiscal year 2000 to fiscal year 2004. We used fiscal years instead of calendar years because we wanted the financial data, kept in fiscal years, to match the non-financial data, kept in calendar years. Furthermore, due to the budgetary process the administration tends to think in terms of fiscal years instead of calendar years. Therefore, each mention of a certain year actually represents that particular fiscal year.

Outcomes and Metrics

In applying the previously defined PSV methodology to Parking Garage B, we devised three outcomes that will allow us to identify whether MassPort has created public value through the management and operation of Parking Garage B. MassPort must focus on maximizing the garage's contribution to the Authority's self-supporting capacity, maximizing the stakeholders reliability on the garage, ensuring the response and attention its customers demand while maximizing their satisfaction and experience. Furthermore, as Exhibit 1 shows, we defined three metrics for each outcome.

1. Maximize MassPort's Self-Supporting Capacity

MassPort is a public authority that receives no state tax funds and is self-supporting through revenue bonds, bridge tolls, parking and aircraft landing fees, tenant rents, and concession fees. Since Logan accounts for over 80% of MassPort's operating revenues, MassPort must maximize the revenue generation of the parking system in order to increase its ability to create public value through its various duties and activities.

1.1 Maximize Parking Revenue Generation

We expect revenue to increase as the number of departing passengers increases. If the revenue remains constant while the number of emplaned passengers increases, either Logan is unable to attract the new passengers to the garage or the parking system is unable to meet the new demand. If revenue falls as the number of emplaned passengers increases, discounts or extra costs due to the increase in demand may be causing the decrease in revenues. Additionally, external factors, such as new security regulations, may decrease parking revenues as the number of departing passengers increases.

Well-wishers accompanying departing passengers are likely the only people to be parking for two hours or less. Due to 9/11, only ticketed passengers are allowed past security checkpoints to the gate areas; therefore, it is likely that the number of well-wishers accompanying departing passengers to the terminals has decreased.[28]

Similarly, the Terminal B garage was closed beginning on September 12, 2001, when the FAA issued a security directive prohibiting parking within 300 feet of any airline terminal. On January 15, 2002, the garage reopened with increased security measures. Travelers are now being asked to open their trunks upon entry to the garage while their vehicles are searched by garage staff. In addition to the searches, vehicles not parked "front in" are being ticketed and towed.[29]

Consequently, we will measure the annual revenue of Parking Garage B per enplaned passenger in Terminal B. This metric is only further standardized by adjusting the annual revenues for inflation.

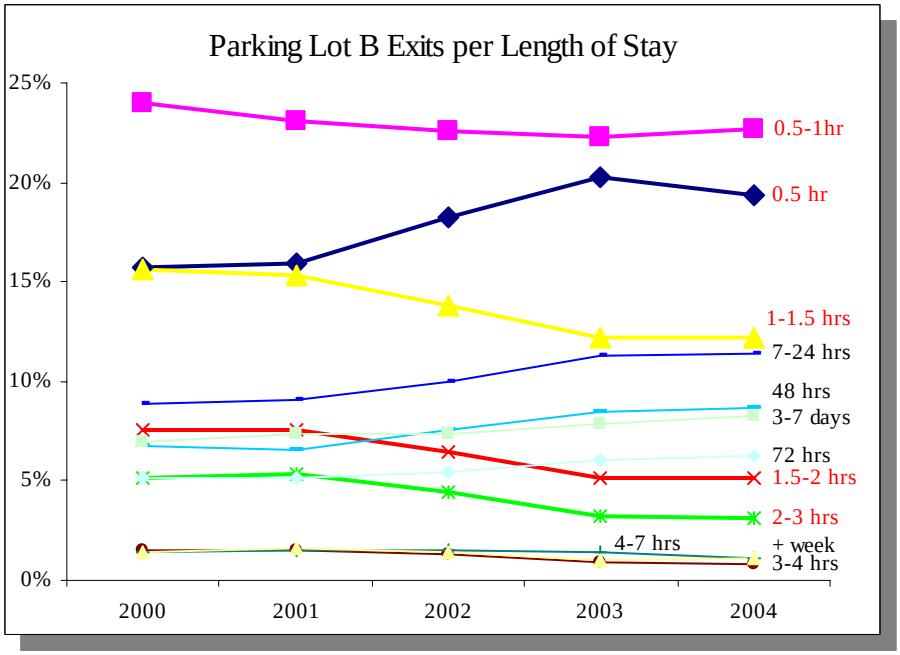
[28] 2003 Logan International Airport Air Passenger Ground Access Survey.
[29] MassPort Press Release.

1.2 Maximize Parking Revenue Generation Targeting

With this metric we want to measure MassPort's ability to differentiate its customers' needs and preferences and set rates in order to extract the greatest revenue from those customers.

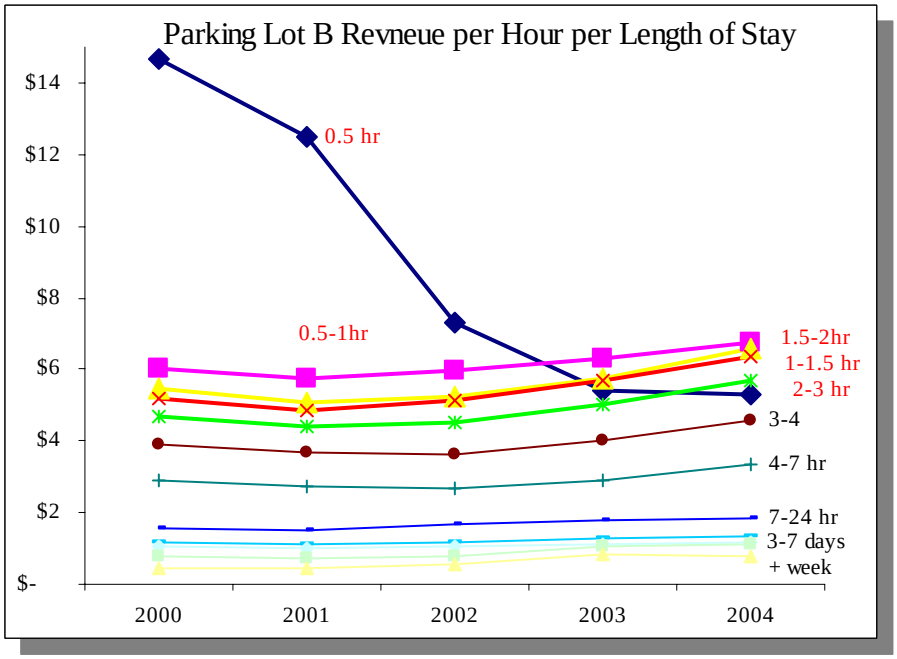
To extract the highest revenue from Garage B, MassPort has to first identify the proportion of exits from each parking event.[30] Then, rates must be set in order to extract the highest revenue per hour from those parking events with the highest share of exits. Therefore, we measured two things, per hour revenue for each parking event and the total exit share of each event. (Figures 1 and 2)

Figure 1



[30] An event is defined as one entry and exit for one car. For our analysis we have set twelve different lengths of stay. They were set to reflect the parking fee structure, and we included four additional categories: 2 days, 3 days, 4 to 7 days and more than 7 days.

Figure 2



As the previous figures show, MassPort has set its rates to extract the highest revenue per hour from the events with the highest share of exits—cars parked for 30 minutes to one hour (pink line), less than 30 minutes (navy blue line), and one to 1.5 hours (yellow line). However, over the past five fiscal years, the revenue per hour from cars parked less than 30 minutes has consistently decreased. In fact, while the share of exits from this event grew (increasing navy blue line in Figure 1), MassPort kept reducing the revenue per hour for this event (decreasing navy blue line in Figure 2). The data for FY04 shows that while the share of exits of cars parked less than thirty minutes rose to nearly the highest share, the hourly revenue of this same event decreased dramatically.

It can be argued that the decrease in revenue per hour for this event was a necessary measure. After 9/11, curbside parking was prohibited, and so MassPort reduced the rate for cars staying less than thirty minutes. Thus, both the increase in exit share and the decrease in hourly revenue can be seen and explained as MassPort's response to the security restrictions imposed by federal authorities. These new exits of less than thirty minutes can be considered to be people who would have parked on the curbside while waiting for someone to leave or arrive.

On the other hand, this rate deduction may have no real benefit to the customers. We do not believe the average person pulls into the garage when loading/unloading passengers; the

person simply does this on the curb or drives around until his/her party is ready to do this on the curbside. It is possible that MassPort hoped to reduce traffic by decreasing the 30 minute rate in the garages; however, if this were the goal, why not simply make 30 minutes of parking free?

Looking at the trends, it is clear that while exits of less than thirty minutes increased, those of one to 1.5 hours decreased in an almost inverse proportion. Again, after 9/11, access to departure gates was restricted to "passengers only" while the waiting time for security checks increased significantly. Before these changes, well-wishers—those who actually leave their cars and accompany passengers to the terminal—would stay with the passengers until their boarding time. Since passengers were asked to arrive an hour or two before their departure, well-wishers could remain with them until they boarded. The restaurants and concessions near the gates provided a perfect waiting place for both passengers and well-wishers. Thus, well-wishers accompanying departing passengers were likely to park for one to two hours.

With all the current restrictions, well-wishers may only stay up to thirty minutes in the terminal. Passengers' concerns for missing their flights due to long security lines make them more likely to pass security right after checking-in. Therefore, the time spent with the well-wishers is reduced and will likely be less than thirty minutes.

The trends observed in the share of exits of these three events—an increase in the share of cars parked less than thirty minutes and inverse trends in the exits of cars parked one to 1.5 hours and 1.5 to two hours—may well be a consequence of the new functioning of the terminal rather than a shift from curbside waiting to short term parking.

In any case, whether the decrease in the rates for short term parking is justified for the limits set on curbside parking or not, we believe MassPort has decreased them beyond the optimal price point. The revenue per hour of this event should not be below events of up to three hours. We believe the rates must be set to generate per hour revenues between the FY2002 and FY2003 levels, i.e. to again generate $5 - $7 an hour. (Table 1)

Table 1
Garage B: Revenue per Hour for Short Term Parking Events

Event	2000	2001	2002	2003	2004
30 minutes	$14.68	$12.49	$7.33	$5.40	$5.27
30 minutes to 1 hr	$6.00	$5.73	$5.95	$6.31	$6.77
1 to 1.5 hrs	$5.47	$5.08	$5.24	$5.76	$6.56
1.5 hr to 2 hrs	$5.19	$4.85	$5.14	$5.69	$6.35
2 to 3 hrs	$4.69	$4.40	$4.53	$5.01	$5.71

In short, to take into account the previously discussed issues, this metric is made up of 12 sub-metrics: each event's per hour revenue multiplied by the corresponding share of total exits.[31]

1.3 Minimize Damage Claims Resulting in Losses

In recent years there has been a significant increase in the claims of cars damaged while parked at Logan. As Table 2 shows, the amount paid to compensate this claims increased from less than $6,000 to $62,000 from FY03 to FY04.

Table 2

Logan Airport: Garage Damage Claims

	All Lots			Garage B		
Fiscal Year	Claims	% Denied	Incurred Value	Claims	% Denied	Incurred Value
2001	67	62.69%	$ 13,020.77	10	70%	$ 1,576.65
2002	38	65.79%	$ 6,889.23	3	100%	$ -
2003	34	76.47%	$ 5,616.92	4	75%	$ 113.28
2004	80	42.50%	$ 62,252.45	8	88%	$ 150.00
2005*	54	24.07%	$ 69,912.34	13	8%	$ 9,989.91

* Year to date March 1, 2005

During the same period, the number of claims presented more than doubled, increasing from 34 to 80, and the percentage of claims denied, that is the percentage of claims that resulted in no monetary loss to MassPort, decreased from more than 75 percent to 42 percent.

It could be argued that the increase in damage claims is primarily a consequence of the stacking and stuffing of cars in Central Garage. Supporting this view is the fact that in Garage

[31] Revenues per hour are adjusted for inflation.

B—where cars are not stuffed or stacked—there have not been as many claims nor have they increased in the way they have in the whole parking system. Actually, they represent, on average, only ten percent of the total claims while the share of exits of Garage B is, on average, thirty percent. Thus, damage claims may only represent an impact on Central Garage's revenues and not on Garage B's. However, for two reasons, damage claims have a significant negative effect on Garage B's revenues and must be part of our analysis. First, as can be seen on Table 2, during the current fiscal year, the number of claims accumulated up to March, 2005, is more than double the average of six claims per year. Also, the proportion of claims denied declined drastically form an average of 80 percent to only eight percent. Not surprisingly, the incurred value rose from an average of $460 to almost $10,000. Furthermore, Garage B's share of total claims is now 24 percent.[32]

The second reason why we believe damage claims have a negative impact on Garage B's revenues is that even if their monetary impact may not be very significant, a high incidence of damage claims likely discourages passengers from parking at Logan. Thus an increase in damage claims threatens Garage B's capacity to generate revenue.

To account for this impact, we will measure the percentage of claims denied per fiscal year. As can be seen in Table 2, this percentage moves inversely to the losses incurred. Thus with this measure we are both taking into account the monetary impact and the indirect impact—through customers' perceptions—that damage claims have on revenues.[33]

2. Maximize Reliability of Service

Travelers and citizens are not concerned with the financial side of the parking garage. They view the parking garage as a public service and thus demand access and service quality. Furthermore, it is the first and the last point of contact with Logan airport for a significant proportion of the travelers. As a public entity, MassPort must maximize the use and efficiency

[32] From the thirteen claims accumulated, eight were breaking and entering events. This high proportion of burglaries is also something unusual compared to the previous years.
[33] Including the amount of incurred losses would not be consistent with the metric criteria of the PSV. While MassPort can deny those claims that are not the responsibility of the lot and control the severity of the damages, it has no control on the value of the cars damaged.

of the parking garage and enhance the ease of movement of cars and people to, from, and through the parking system.

From the passenger's point of view, a reliable parking garage is that parking garage where one can always find a parking space. And an even more reliable parking garage would be one where finding a space did not require driving around for too long. Therefore, to measure the reliability of the service provided by Garage B, we are going to measure how many times the garage reached its capacity and had to close, for how long the garage was unable to receive cars, and how many cars were not able to park. Ideally—in terms of closures—both the number of closures and the length of each closure should decrease.

Considering only one of these metrics could foster undesirable management practices. For instance if only the number of closures were measured, a manager could be tempted to wait until many spaces free up before reopening the garage. Thus the time the garage remains closed is longer than optimal because keeping the garage closed for a longer time may prevent future closures on the same day.

On the other hand, if only the time the garage remains closed is measured, the manager could be tempted to reopen the garage as soon as the first space becomes available. Yet if the numbers of cars entering the garage once it is reopened cannot be controlled—by allowing one car per available space—opening the garage as soon as the first space becomes available will lead to many drivers circling around looking for a space.

2.1 Reduce Parking Gap

For the past five years, Logan's parking facilities have not been enough to meet the customers' parking demands. MassPort has responded in different ways. Before the new leadership assumed control, the authority encouraged travelers not to park at Logan. However, more recently it has adjusted its inventory to face the new demand. The parking gap measures MassPort's average daily ability to meet the current demand, in number of parking spaces demanded over and above the supply of space.

For this metric we use Garage B's supply and demand data. The supply of parking spaces has remained constant throughout the period analyzed, except for the last three months—April, May and June 2004—when twenty of the 2,962 spaces were not in use. The average daily

demand for each month is estimated with the highest peak count for that month.[34] Therefore, we calculate the average daily parking gap for every month as the difference between the month's highest peak count and the total available spaces in the garage. Thus the metric we obtain at the end for each fiscal year is the average daily parking gap, or the average number of cars that were diverted from the garage. The final normalized score uses the inverse of the average daily parking gap so that an in increase in the final normalized score reflects a reduction of the parking gap below the period's average value.

2.2 Reduce Parking Garage Closures

As previously mentioned, we will measure, on average, how many times per fiscal year the garage reached its capacity and had to be closed.[35] The final normalized score uses the inverse of the annual number of closures so that an increase in the final normalized score reflects a reduction of the number of closures below the analyzed period's average value.

2.3 Reduce Length of Closures

We will measure the average number of hours the garage is closed during each closure throughout the year. The final normalized score uses the inverse of the annual average length of each closure so that an increase in the final normalized score reflects a reduction of the length of the average closures below the analyzed period's average value.

3. Maximize Responsiveness to Customers[36]

This outcome reflects the quality of service provided and measures the public's perception of the parking system, based on customer feedback. We calculated the first two metrics using the results from the "Logan Airport Passenger Surveys" conducted in November 2002, February 2003, November 2003 and March 2004. Because we had no data for FY02, we used November 2002's data as a proxy for all of FY02; we used February 2003 for FY03's data; and we used the average of November 2003 and March 2004 for FY04's data.

[34] Peak counts are taken during the lot's busiest days—Tuesday, Wednesday and Thursday.
[35] We were only able to get data for closures after June 14, 2002. However we know the lot remained closed 123 days after 9/11. In order to estimate the full fiscal year metric we used this information and an average of the closures for the missing months—July, August and half of September—from the other available years.
[36] The authors would like to thank Ms. Evelyn Addante of MarketSense in Charlestown, MA, for her extensive assistance in the gathering and interpretation of survey data.

Though we do not have full scientific details about the surveys, we do know the following: over 95 percent of the respondents were passengers on either American Airlines/American Eagle or US Airways, so they were potential customers for the Terminal B garage; each of the five surveys had between 720 and 800 respondents; the responses were given by hand on a MassPort questionnaire.

3.1 Minimize Customers' Concerns about Parking

One of the questions asked in the surveys is: *How much of a concern were each of the following issues to you before coming to Logan today?* Respondents answer whether (a) security, (b) parking, (c) traffic getting to Logan and (d) flight delays and cancellations were (i) a great concern, (ii) somewhat a concern or (iii) not a concern. In this metric we calculate the percentage of respondents that answered that parking was somewhat a concern or not a concern. Thus an increase in the metric score reflects a decrease in the percentage of those passengers that considered parking as a great concern before going to Logan.

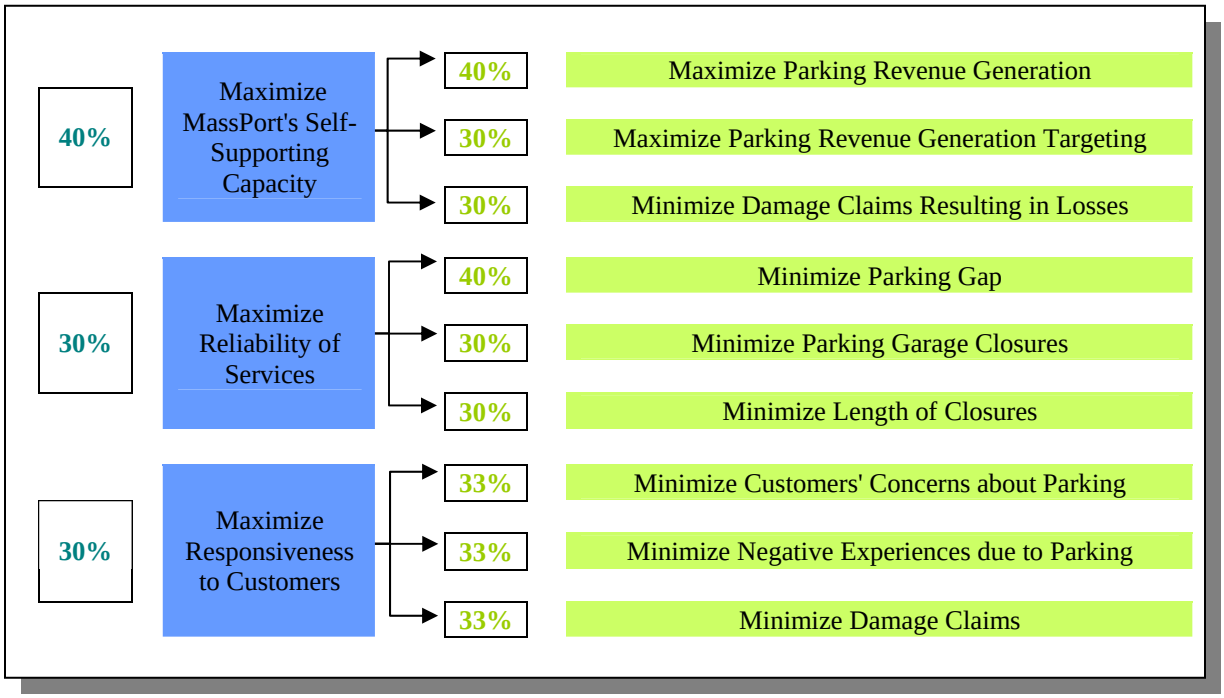
3.2 Minimize Negative Experiences Due to Parking

Survey respondents were also asked to rate their experience at Logan as (i) very positive, (ii) somewhat positive, (iii) no impression either way, (iv) somewhat negative or (v) very negative. If a person that states to have had a negative experience at Logan also considered parking as a concern we will assume the negative experience was mainly due to a negative parking experience. Thus in this metric we will measure the percentage of respondents that had a negative experience at Logan that also considered parking as a concern. An increase in the inverse score of this metric will therefore reflect a decrease in the percentage of passengers who had a negative experience at Logan associated with parking.

3.3 Minimize Damage Claims

Any person that takes the time to file a damage claim—even if its invalid or it turned out not to be the Garage's responsibility—will surely have a negative opinion about the parking garage. Therefore the number of claims can be used as a proxy of negative customer experience. This measure, the annual number of damage claims, is standardized by the annual number of exits and the metric score is calculated with the inverse of the ratio of claims to exits. Thus, an increase in the score of this metric reflects a decrease in the annual ratio of claims to exits.

Weights



The model's weights were defined with MassPort in order to give an equal value to each of the metrics and thus the outcomes. However, the first outcome—Maximize MassPort's Self-supporting Capacity—was assigned a higher weight due to its primary importance to the MassPort model. Without the extra income from the garage, many of MassPort's activities would have no money with which to operate. Though many employees of MassPort might prefer a model in which the garages are less focused on revenue generation, the weights were proportioned to reflect the realities of MassPort's current situation.

Explanation of Selected Outcomes/Metrics Not Included in Analysis[37]

Metrics

Within Outcome 1: Maximize Self-Supporting Capacity

- **Maximize Logan's Parking System Market Share**

  % Private Vehicle of Total Automobile Ground Arrival Mode

  % of Private Vehicles Driven Away Without being Parked

  MassPort has promised to foster the use of High Occupancy Vehicles (HOV) to reduce traffic in the neighboring communities of Logan. To measure Logan's effort to increase its parking market share while still maintaining its promise to the neighboring communities, we should only look at changes in the share of private vehicles from the total automobile ground arrivals. That is, MassPort will increase its revenues if—from among those travelers that arrive by automobile—the percentage of people driving their private vehicles increases. Moreover, besides looking at the share of private vehicles used for ground arrival we should determine how many of these cars are actually parked at Logan. To measure this we will look at the percentage of private vehicles driven away without being parked.

Within Outcome 2: Maximize Reliability of Services

- **Enhance Movement of Cars**

  Average Transaction Time per Cashier

  Number of exits per hour per number of available cashiers

  An efficient exiting system both minimizes wait time for customers and limits the amount of time employees spend not actively working ("dead hours"). These two measures counter-balance each other to measure the system's efficiency. First, the average transaction time per cashier aims to measure the individual efficiency of each cashier. The less time each customer spends dealing with the cashier, the better.

[37] We did not include these metrics because either they were not measured by MassPort or we could not collect reliable historical measurements.

Second, the number of transactions per lot per hour divided by the number of available cashiers helps tell us whether cashiers are, on balance, busy or not busy.

The first number tells us the maximum number of transactions per hour each cashier could possibly do. The second number tells us the actual number or transactions per hour each cashier is actually doing. Taken together, we can figure out if a cashier has dead hours or if he/she works continually during each hour. This is best explained by an example: if a cashier averages 1 minute per transaction, he should probably do between 30-50 transactions per hour. If he does less than 30 transactions per hour, half his time is dead hours, and he's probably not needed in that lot at that time. If, however, he does over 50 transactions per hour, he probably has a line forming at his cashier with excess cars waiting to pay. Neither of these situations results in the greatest efficiency.

Within Outcome 3: Maximize Responsiveness to Customers

Earlier surveys measured two important metrics regarding customer satisfaction with their parking experience; these two questions should be added back onto the surveys.

- **Customer Satisfaction with Signage**
- **Customer Satisfaction with Transfer from Parking to Terminal**

Outcomes

Optimize System Preservation

As traffic continues to grow, it is important to preserve the publicly owned parking system at a specified state of repair or condition. This outcome primarily relates to the physical state of the system.

This outcome was not included because neither the authors nor MassPort officials could decide upon the correct performance measures. The first problem was the lack of data on the quality of repairs. Simply measuring the number of repairs would not tell us about the quality; however, no data existed beyond the number of repairs. Furthermore, we could not accurately

measure preventative versus reactive repairs. In order to keep the garage in good repair, it requires a certain level of preventative maintenance along with the appropriate level of reactive repair. In addition to the lack of segmented data, we could not reach a decision about the appropriate numbers of each type of repair.

Optimize Economic Planning (Infrastructure Planning)

It is important to embark on development that will accommodate current/future demand by working with private industry, regulators, and external transportation alliances; however, the scope of our final analysis precluded the use of this outcome.

Sample Metrics For Other Lots

Our hope is that MassPort may be able to apply an adapted version of our model to other parking activities at Logan. If its managers chose to do so, the following is a list of potential metrics they can include in the model in order to help in its effective application to other lots.

Outcome 1: Maximize Self-Supporting Capacity

- **Maximize Revenue from Extra Services**

  Annual Growth of Extra Services Revenue

  From a revenue maximizing point of view, these services are only relevant if the revenues they generate grow, or at least remain constant, as revenue from parking increases. If they decrease as parking revenues increase, or remain constant, there is not "revenue motivation" to offer them.

- **Maximize Revenue from Adjusted Parking Inventory**

  Ratio per Hour Revenue from Adjusted Parking Inventory divided by Average Starting Parking Inventory per Hour Revenue

  On an average weekday, Logan is short approximately 3,400 spaces per day. To meet excess demand, parking management has created additional spaces by providing spaces in overflow lots, lining cars in the walkways, and stacking cars in the top deck

or in the long-term aisles. However, from a revenue point of view, these activities should only be undertaken if they generate additional revenues. Ideally, these activities should provide the same revenue per hour as the average per hour revenue of standard parking options in each lot.

- **Minimize Parking Polices with Negative Effects on Revenue**

Total Annual Discounts in Other Services Offered by MassPort in order to Reduce the Number of Cars Parking at Logan

For almost three years Logan offered half-price discounts on round-trip fares for all three Logan Express services, Logan Direct, and the Rowes Wharf Water Shuttle during the highest traveling seasons: February school vacation, Thanksgiving, and Winter Holidays. Whenever MassPort anticipated that heavy passenger volume would limit parking spots, they offered these discounts to detract travelers from driving and parking at Logan. Therefore, during these two-week periods insufficient parking capacity reduced some of MassPort's alternative revenue sources. Thus this metric measures the negative effect that this parking policy has on MassPort's Self-Supporting Capacity.

Outcome 2: Maximize Reliability of Services

- **Enhance Movement of People**

Traveling Time on Courtesy Buses

Waiting Time for Courtesy Buses

The rationale of the parking lot is to facilitate travelers' access to Logan Airport, therefore an efficient parking system must enhance the travelers' transfer from their car to the terminal, and vice versa. Travelers can either walk to the terminal or, in some cases, take a courtesy bus provided by MassPort. Significant improvements have been achieved in this area. Two new walkways connecting Central Parking to Terminal

B and C were built in recent years. Now each of Logan's terminals has a direct, convenient connection to Central Parking.

One could measure the parking system's access to the terminals using the waiting time and traveling time for the courtesy buses that transport travelers from the distant lots to each of the terminals and between terminals.

Analysis of Findings

Parking System Performance

MassPort's self-supporting capacity from Garage B at Logan has increased steadily over the past three years. We attribute this increase to four factors:

- We attribute the increase in self-supporting capacity from 2002 to 2004 primarily to the dramatic increase in revenue. 2001 and 2002 saw downturns in revenue due to the lack of emplaned passengers, and resulting lack of parking customers, stemming from the 9/11 terrorist attacks. However, with the number of travelers steadily approaching pre-9/11 levels, revenue generation from the garage is back on the rise.
- Though 2000 and 2001 had more exits than the other three years, revenue was not as high because the rates have subsequently increased, resulting in the more recent increased generation of revenue. Furthermore, beginning in 2002, the rate tables eliminated the maximum weekly charge. While this may have dissuaded a few parking customers, it seems to have been worth the loss in order to generate higher revenue.
- We are concerned that MassPort has not been able to more effectively generate revenue from targeting specific market segments. Without doing this, MassPort is foregoing revenue that they could take advantage with under the proper targeting system. Our recommendations include a suggestion for trying to fix this problem.
- Though 2004 saw an increase in the minimization of damage claims resulting in losses, 2005 has not started well in this area. Table 2 shows that 2005 has already seen a very dramatic upturn in the losses from damage claims. This results primarily from the fact that measures taken to accommodate extra cars are much more likely to result in damage.

The reliability of Garage B's services has decreased dramatically during the past year and decreased overall since 2000. We attribute these problems to the following reasons:

- MassPort executives know that they currently have problems with overcrowding in the parking lots, and they realize they generally have more demand for parking spaces than supply. They hope that the $200 million upgrade to Central Parking will help alleviate much of the overcrowding in Garage B; however, in order to enhance Central Parking, they had to close access to several of its spaces. Therefore, when the project is complete, executives hope the supply in Garage B will more closely fit the demand.
- In FY02, which includes 9/11, the parking gap was so great because Garage B was closed for approximately three months. Because passenger levels had not fully recovered during FY03, Garage B experienced very little parking gap. Then, as passenger levels increased in FY04, the parking gap began to reach levels similar to that of FY01.
- Though the number of closures and length of closures (excluding the three months post-9/11) have remained fairly constant over time, the ability to minimize the parking gap remains below average. This happens because even though the garage may be closed for the same amount of time, more and more cars are turned away with each closure. Therefore, 2004 saw many more cars turned away during closures than did 2003.

Although parking customers seem relatively happy, or at least indifferent, MassPort's responsiveness to customer concerns has recently decreased.

- The lack of minimization of damage claims brought down the responsiveness score for 2004. Since Garage B does not participate in the stuffing or stacking of vehicles, the reason for the downturn seems difficult to identify. One possible explanation for the increased number of claims is simply the increase in vehicular traffic at Logan; we would expect more traffic to bring proportionately more claims.
- We are concerned about the initial data for 2005 concerning damage claims and payouts. While the number of exits will likely increase in 2005, the number of claims and payouts have already reached disproportionate levels. As noted earlier, this creates problems for both revenue generation and customer satisfaction. Furthermore, we are concerned that many of the claims involve the breaking and entering of customers' cars. MassPort can

expect great backlash from the media and the public if it gets a reputation for not being able to protect cars while parked on its property. If this is, in fact, a problem, the solution may involve installing more security cameras or employing more security guards.

Public Value Creation

The final 2 X 2 matrix shows that MassPort has rarely created public value over time in the Terminal B Garage. In 2000 and 2001, the garage was able to stay positive in at least one dimension because exits were relatively high. The results would have been even greater for these two years had the garage been operating under the current rate table. 2001's score was worse than 2000's primarily due to the inability to minimize losses due to damage claims; 2001 was particularly high in the amount of revenue lost to these claims. Furthermore, the parking gap increased significantly from 2000 to 2001.

2002 saw a downturn in public value creation resulting primarily from the consequences of 9/11. 9/11 was such a drastic impediment to the world economy that neither MassPort, nor any other airport in the United States, could have taken any action to counteract the value destruction that inevitably followed it. Therefore, 2002 predictably falls in the lower, left-hand quadrant of the matrix.

In 2003, the Terminal B Garage rebounded nicely from the events of 2002. The high 2003 score resulted from both greater achievement of outcomes and more cost effectiveness in doing so. The minimization of claims and damages lost, the more infrequent parking gap, and the higher revenue collected due to higher rates all played a significant role in the value creation of 2003.

Our greatest concern is the garage's score for 2004. Though it stems from a variety of factors, we think the underlying reason is that the garage has overextended its operational capacity. Because it has reached capacity, the garage's management can no longer realistically hope to significantly increase outcomes, and as costs inherently rise over time, lower and lower PSV scores will result. Each week brings more and longer closures, a larger parking gap, more revenue lost to damages, and lower customer satisfaction, while exits do not increase. Management will be unable to compensate for the higher costs because they will have few

options by which to increase revenue. Since exits cannot increase, the only way to increase revenue is through an increase in rates, which is neither easy to implement or satisfactory to customers. Therefore, MassPort must consider options by which it can increase capacity for Terminal B parking customers.

How MassPort Can Use PSV Analysis to Continue Improving

Once MassPort studies different alternatives and narrows down the options by which it can increase capacity for Garage B, executives should use a continuation of our PSV model to analyze the alternatives. Executive should seriously consider only those alternatives that they estimate will create public value over time.

Furthermore, MassPort executives could conceivably "manage to the outcomes." In order to do this, they would need to focus their energy on increasing their score for each metric, while simultaneously increasing their cost effectiveness. While we do not necessarily recommend managing directly to the outcomes, MassPort could increase public value by focusing on performance measures. Through this process, they could impress upon the employees the importance of certain measures, enabling the organization to create public value.

Limitations

With the Data

We encountered three primary limitations during our data collection. In some cases, we uncovered data through persistent searching, and in others we were forced to complete our analysis without the data. The limitations were the following:

- *Lack of complete historical data*. The data we used to create our metrics comes from various sources within MassPort. Although we have metric scores for each of the years analyzed, four metrics lack data for FY00 and FY01. We are missing data on the *average daily length of closures* and *the annual number of closures* for these years. According to MassPort sources, they started keeping record of closures in FY02. Similarly, we are missing data for the *% of passengers who considered parking a great concern* and *% of*

passengers who had a bad experience and also said parking was a great concern. We were only able to get the surveys starting with November 2002 because MassPort apparently contracted a new company to conduct the surveys starting with that date.

Despite the lack of this specific data we were able to conduct our analysis for the five fiscal years because—as can be seen in the graphs in Exhibit 3 (Metrics 2 and 3) and Exhibit 4 (Metrics 1 and 2)—the scores for these particular metrics did not fluctuate much around their average value. Thus, extrapolating the missing observations was plausible. We estimated the missing observations first by calculating the average for the three years of available data and calculating the average growth rate among these years. Then, we used the average value as the observation for 2001. Using the calculated growth rate, we estimated the observation for 2000.

- *Lack of Customer Satisfaction Surveys*. While we were finally able to find a small number of customer service surveys, we did not have enough customer data. While this limited our model, it raises a bigger concern for MassPort. Without this data, MassPort may not have a clear, robust picture of its parking customers. This lack of knowledge may limit MassPort from generating greater revenues and/or achieving higher levels of customer satisfaction.

- *Existence of Conflicting Data*. In many cases, we received conflicting data from MassPort personnel. MassPort should not have conflicting data for the same events/items within its organization. The risk with conflicting data is that managers or executives might make decisions based upon this unsubstantiated data. One reason the data may exist in this form is because it was collected and/or analyzed by different people with different goals; therefore, the numbers looked different by the time they got to us.

With the PSV

From an academic and a practical perspective, the PSV Model had four significant deficiencies:

- *Only a historical analysis; does not tell managers how to act in the future*. The PSV does a good job of depicting the past, but it lacks a mechanism for planning future actions. It does, to its credit, give managers an idea what actions may have helped create public value in certain years, but it does not necessarily point to what actions will work in the future.

- *No benchmarking mechanism*. The PSV does not include any way to measure an agency's performance against that of another agency. For instance, if a competing agency is creating more public value at a greater rate, an agency's value creation could, in fact, give it a false sense of security. Therefore, it would be advantageous to benchmark the PSV's performance metrics for one entity against those of another.
- *Not meant to analyze agencies in a great state of flux*. In this case, we had to limit the scope of our analysis because the model only fits well those organizations in a steady state of operations. In the case of the Central Parking Garage, MassPort had to destroy public value by closing some parts of the garage in order to work to expand other parts of the garage and thereby create greater public value. The model does not include a method for which this type of situation can be included.
- *Fits best with true public agencies*. In truth, the PSV Model was created specifically to analyze public sector organizations. It was devised to fill a niche in the market that few, if any, models could adequately claim. However, it proved a bit inflexible as we tried to apply it to an organization that operates more like a private business than a public entity.

Recommendations

During our work with MassPort and our analysis of Garage B, we have noticed several changes that could be made or actions that could be taken in order to increase efficiency and value creation.

- *Align strategy across MassPort.* The strategy of parking operations at Logan means something very different to many of MassPort's employees. While one department might seek to generate the most revenue, another may seek to limit private vehicle parking for environmental reasons, while still another may wish to achieve operational efficiencies despite both revenue and environmental concerns. MassPort employees, overall, seem to lack a clear vision for what Logan's parking operations ought to look like. Therefore, MassPort executives ought to formulate a strategy that encompasses each of these concerns while moving in the direction that best benefits the Authority, its customers, and the entire region.

- *Use performance metrics to manage more effectively*. We did not get the sense that parking data is reviewed often enough by MassPort executives. First, performance measurement/revenue control systems must be implemented for each garage. Then these performance metrics (like the ones in our model) must be agreed upon and discussed regularly. At a monthly meeting, senior executive should review the metrics and make operational decisions accordingly.

- *Consolidate parking data analysis*. No one person at Logan has all the parking data nor understands all the possible implications of that data. For instance, one person has revenue data but another one has cost numbers while one person has complaint logs but another one has maintenance records. For this reason, no manager can make quick operational decisions that must take into account numerous complexities. Parking operations should have an employee dedicated to the preparation and analysis of all parking garage data. An employee like this would give managers a resource when they need to make quick decisions and allow them to make small adjustments on a daily basis. An employee like this with the proper systems in place could greatly increase efficiency, decision-making, and revenue generation.

- *Analyze major system upgrades like those mentioned at other airports*. The marketplace now has many other proven systems that can better utilize technology in the management of parking garages. MassPort should both study these more in-depth and speak with other airports/garages that have implemented these systems. Not only would this assist in revenue control and price targeting, but also it could play a major role in the decision-making process for mid- and executive-level parking managers. Furthermore, certain systems could drastically reduce the traffic congestion and more efficiently empty and fill garages.

- *Study dynamic pricing and its potential for greater revenue generation*. Dynamic pricing, while not studied in-depth, offers advantages in revenue generation not currently realized by MassPort. We know of no other airports currently experimenting with a system like this, but it would be worth MassPort's time to see if a system of this nature would be appropriate for Logan's parking garages. If this system could, in fact, generate higher revenues, MassPort might be able to lower rates in order to achieve higher

satisfaction. Or, it could simply collect higher revenues in order to subsidize another of MassPort's important activities.

- *Increase public awareness of products and their benefits/conveniences*. Public awareness is one reason why new parking products do so well. The public must first know and be aware of these products, and then they must be comfortable using the new products. When rolling out new products, like pay-on-foot and frequent parker programs, MassPort should embark upon generous public awareness campaigns in order to promote their products and demonstrate their conveniences.
- *Improve quarterly customer surveys*. Though MassPort sponsors quarterly surveys of its passengers, they lack important pieces of information. First, the surveys need more structure. In order for decision-makers to use the survey data, they need concise reports on the data and clear interpretation of the customers' needs. Second, in order to perform accurate analysis, the questions must be consistent over time. Third, the surveys lack certain questions that could give meaningful insight into the parking operations. For instance, when the survey creator was asked why the surveys no longer included questions about signage in the garages and ease of movement between terminals and garages, she admittedly had no good reason for their disappearance. Furthermore, the surveys could include questions that would help MassPort more effectively track their EDR goals. For instance, the survey should include questions about HOV use when traveling to Logan. Taking time to upgrade the quarterly passenger surveys would result in a better analysis of customers' needs and desires regarding their parking experiences.

Conclusions[38]

The parking system, and specifically the Terminal B Garage, generates such an important piece of MassPort's revenue that executives should devote significant amounts of time to getting this garage back on the positive side of public value creation. Revenue generation is important to this value creation and can be enhanced using some of our recommendations. However, while

[38] This paper would not have been possible without the generous support of Accenture or MassPort. We are grateful to the employees of both companies for their assistance and support throughout our analysis.

it is tempting to measure the garage on revenue generation alone, the customers must be taken into great consideration. Customers must be able to rely upon the service and then leave satisfied with their experience. The greatest area of concern facing the garage, its reaching of operational capacity, must be addressed immediately and revisited frequently by executives. Using this PSV model as a management tool, executives will be able to generate public value creation from the garage.

Exhibit 1

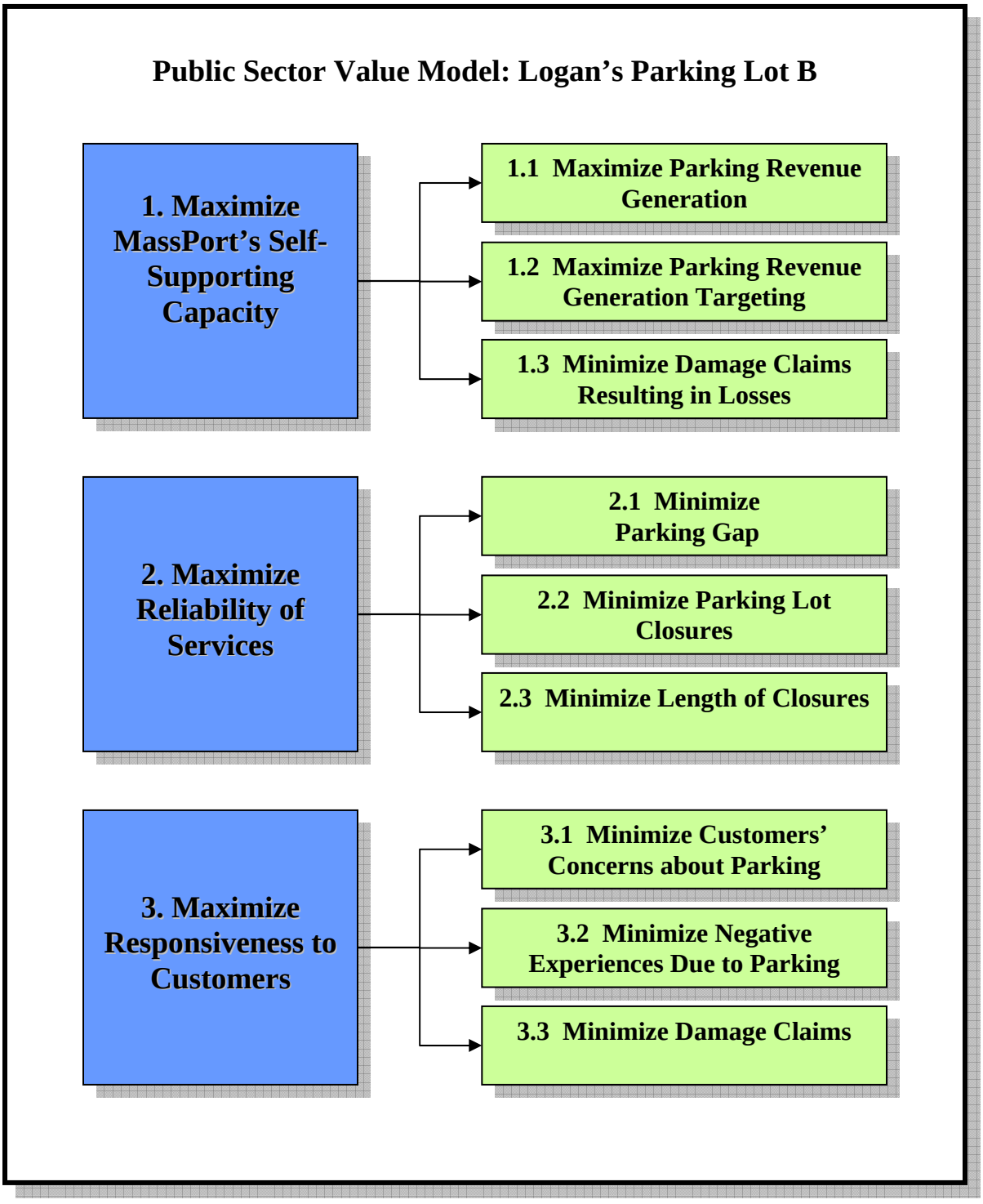
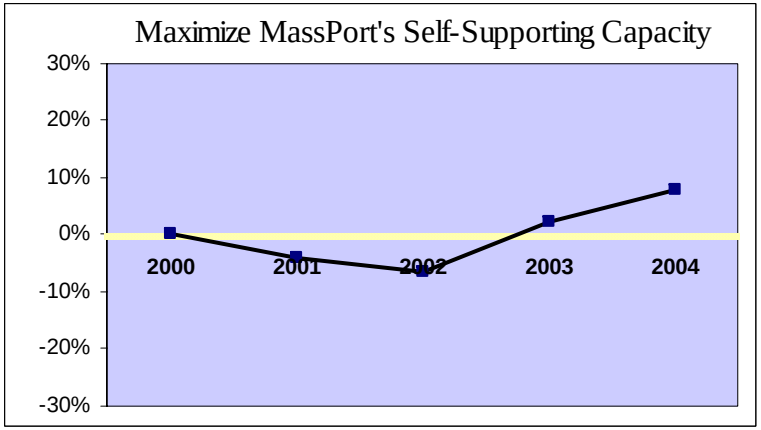

Public Sector Value Model: Logan's Parking Lot B
1. Maximize MassPort's Self-Supporting Capacity
1.1 Maximize Parking Revenue Generation
1.2 Maximize Parking Revenue Generation Targeting
1.3 Minimize Damage Claims Resulting in Losses
2. Maximize Reliability of Services
2.1 Minimize Parking Gap
2.2 Minimize Parking Lot Closures
2.3 Minimize Length of Closures
3. Maximize Responsiveness to Customers
3.1 Minimize Customers' Concerns about Parking
3.2 Minimize Negative Experiences Due to Parking
3.3 Minimize Damage Claims

Exhibit 2

Outcome 1: Maximize MassPort´s Self-Supporting Capacity

Outcome



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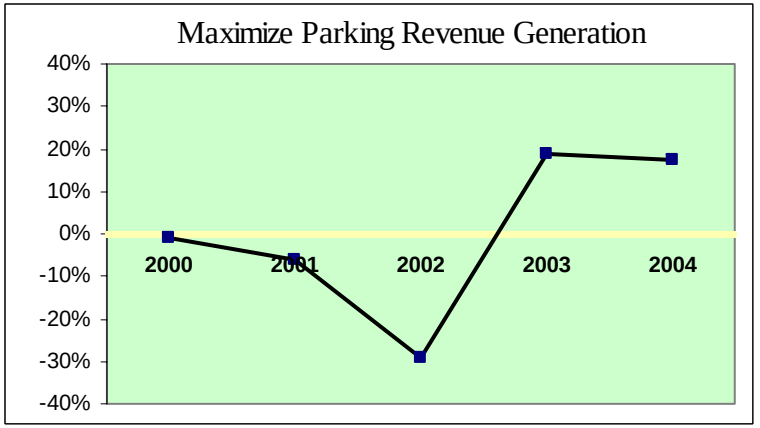
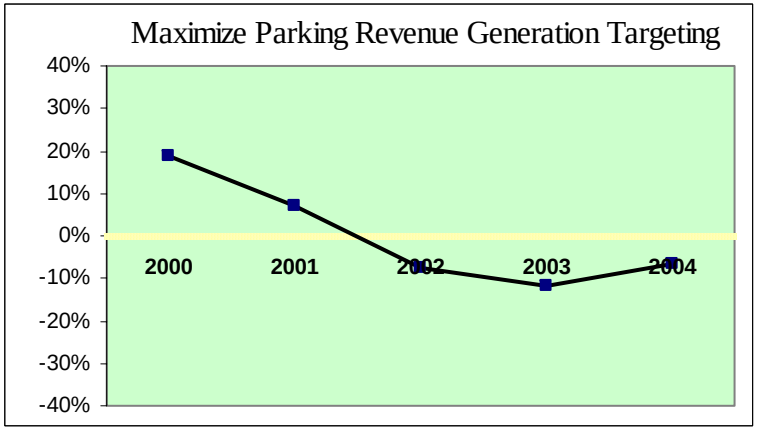


2nd Metric



3rd Metric

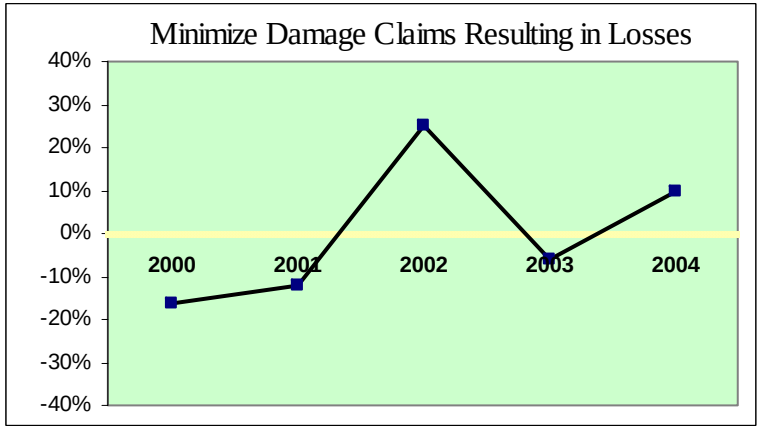
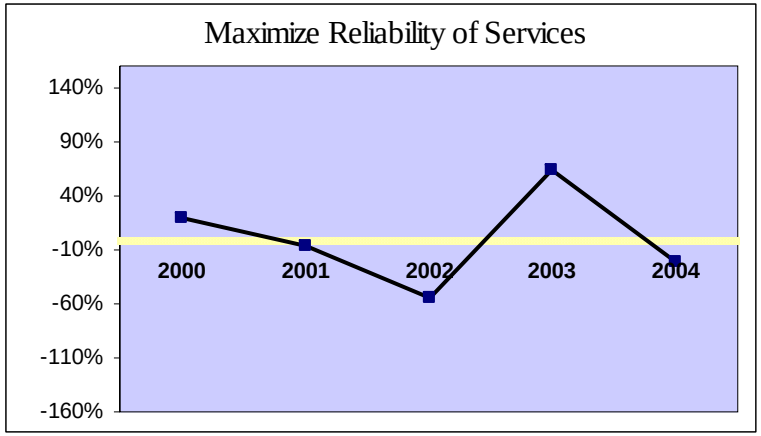


Exhibit 3

Outcome 2: Maximize Reliability of Services

Outcome



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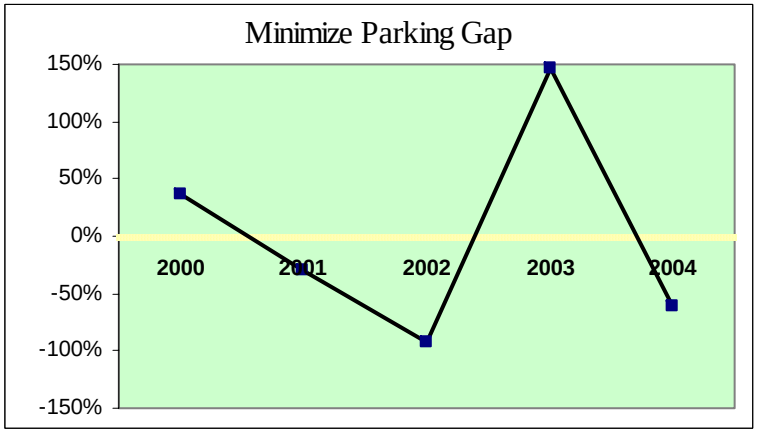

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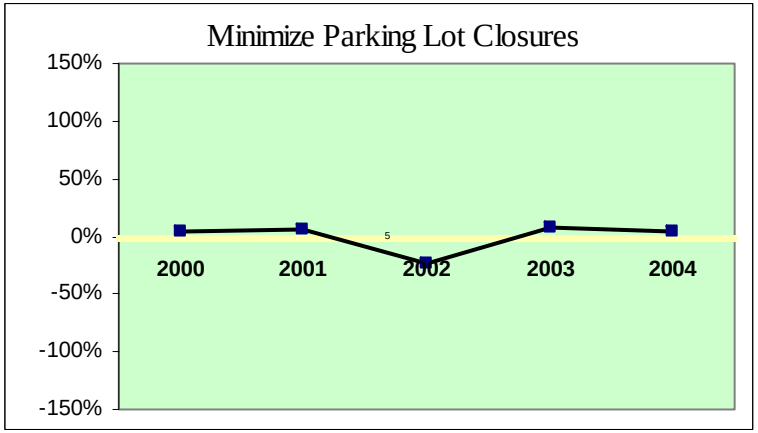

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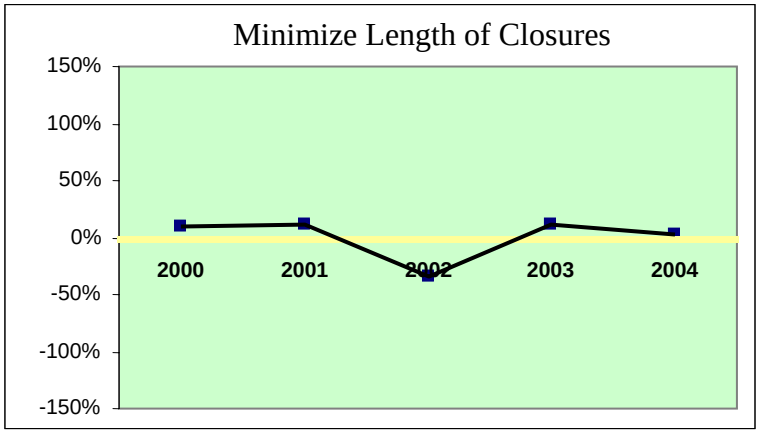
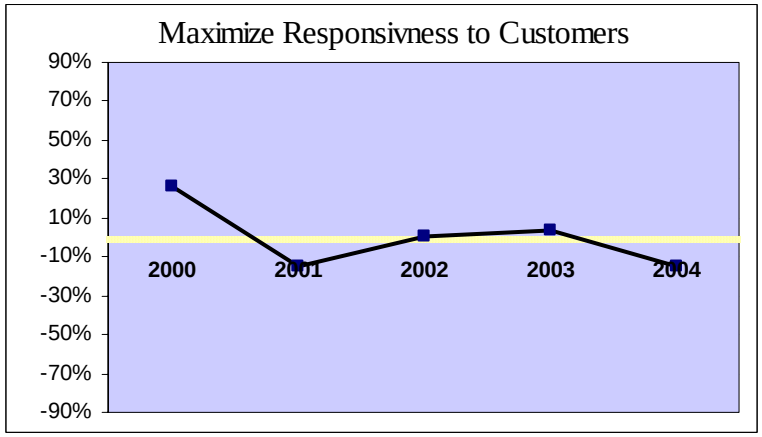


Exhibit 4

Outcome 3: Maximize Responsiveness to Customers

Outcome



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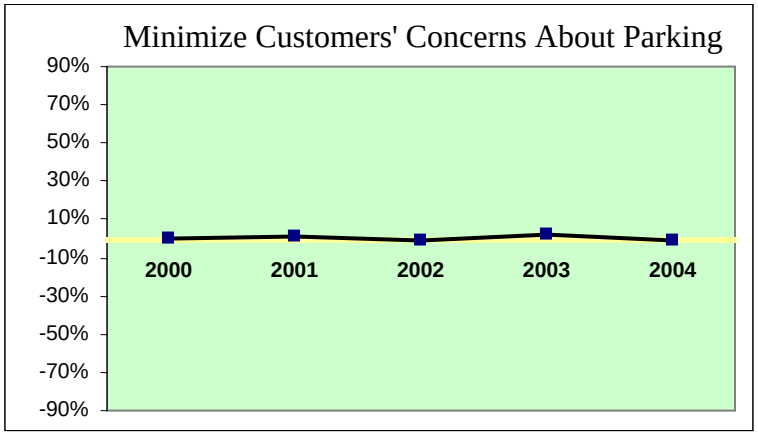

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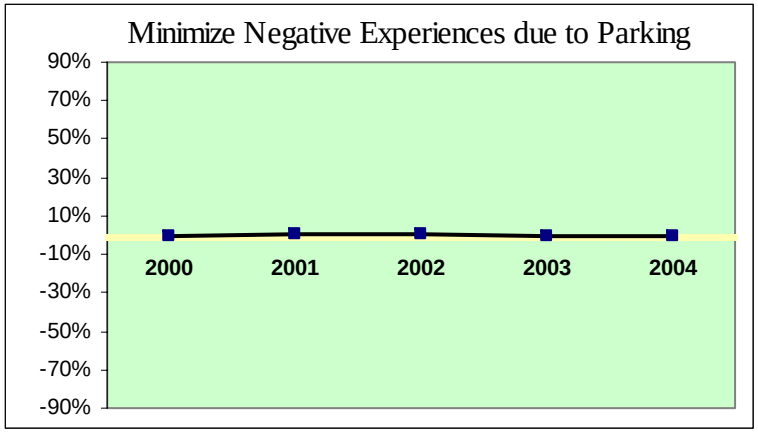

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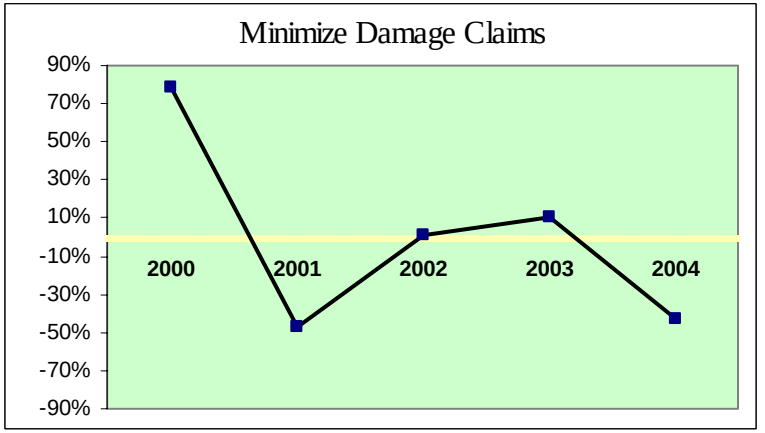
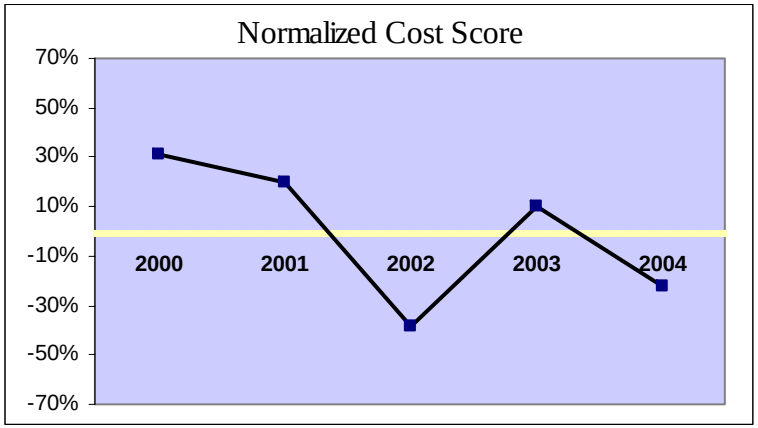
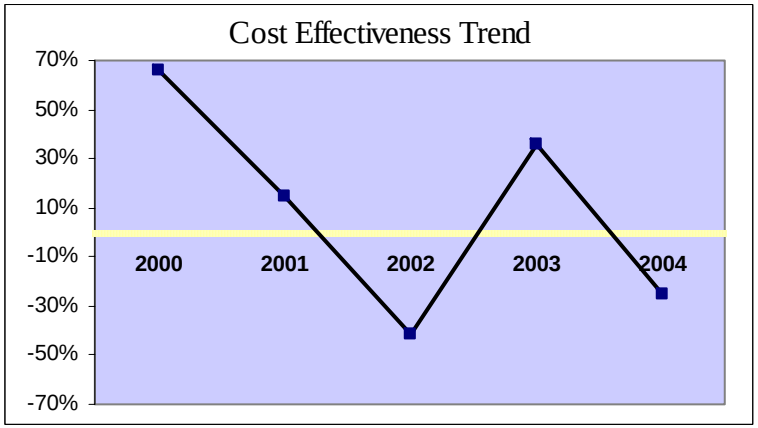


Exhibit 5

Cost Effectiveness and Outcome Trends





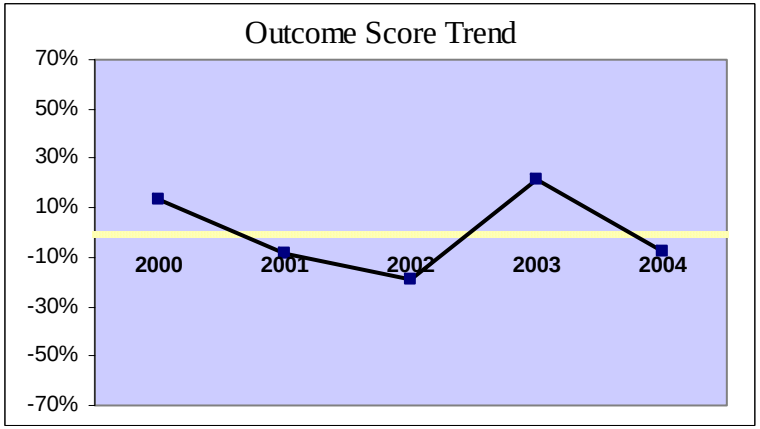


Exhibit 6

Public Sector Value Matrix

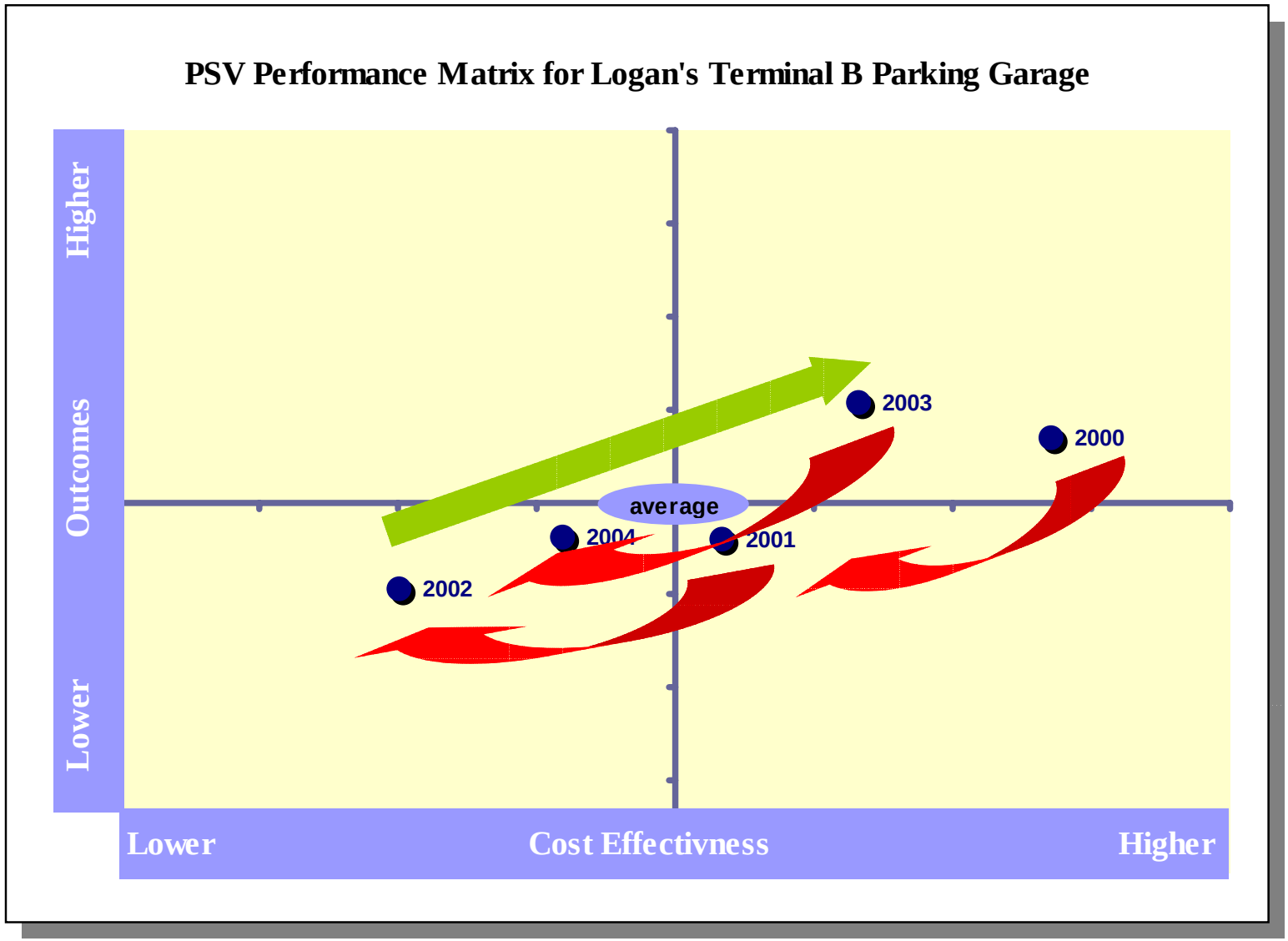


Exhibit 7

Outcomes						
	weights	2000	2001	2002	2003	2004
1. Maximize MassPort's Self-Supporting Capacity	40%	1.003	0.961	0.937	1.022	1.078
2. Maximize Reliability of Services	30%	1.191	0.929	0.457	1.644	0.779
3. Maximize Responsiveness to Customers	30%	1.259	0.847	1.002	1.040	0.853
Weighted Average Score		1.136	0.917	0.812	1.214	0.920
Deviation in % from average score		0.136	-0.083	-0.188	0.214	-0.080

Adjusted Cost					
	2000	2001	2002	2003	2004
Normalized Cost Score	0.736	0.859	1.346	0.960	1.099
Deviation in % from average score	*-0.264*	*-0.141*	*0.346*	*-0.040*	*0.099*

	2000	2001	2002	2003	2004
Normalized Cost Effectiveness Score	1.545	1.068	0.603	1.264	0.838
Deviation in % from average score	*0.545*	*0.068*	*-0.397*	*0.264*	*-0.162*

Exhibit 8

		2000	2001	2002	2003	2004
1	**Maximize MassPort's Self-Supporting Capacity**					
	Normalized Outcome Score	1.003	0.961	0.937	1.022	1.078
	Deviation in % from average score	*0%*	*-4%*	*-6%*	*2%*	*8%*
1.1	**Maximize Parking Revenue Generation**					
	Revenue per enplaned passenger	3.52	3.35	2.52	4.23	4.18
	Normalized PSV Score	0.99	0.94	0.71	1.19	1.17
	Deviation in % from average score	*-1%*	*-6%*	*-29%*	*19%*	*17%*
1.2	**Maximize Parking Revenue Generation Targeting**					
1.2.1.1	Revenue per hour for cars parked less than 30 min	$14.68	$12.49	$ 7.33	$ 5.40	$ 5.27
1.2.1.2	Revenue per hour from cars parked 1 hr	$ 6.00	$ 5.73	$ 5.95	$ 6.31	$ 6.77
1.2.1.3	Revenue per hour from cars parked 1hr to 1.5 hrs	$ 5.47	$ 5.08	$ 5.24	$ 5.76	$ 6.56
1.2.1.4	Revenue per hour from cars parked 1.5 hrs to 2 hrs	$ 5.19	$ 4.85	$ 5.14	$ 5.69	$ 6.35
1.2.1.5	Revenue per hour from cars parked 3 hrs	$ 4.69	$ 4.40	$ 4.53	$ 5.01	$ 5.71
1.2.1.6	Revenue per hour from cars parked 4 hrs	$ 3.91	$ 3.66	$ 3.61	$ 4.00	$ 4.56
1.2.1.7	Revenue per hour from cars parked 4hrs to 7 hrs	$ 2.88	$ 2.73	$ 2.67	$ 2.91	$ 3.35
1.2.1.8	Revenue per hour from cars parked 7hrs to 24 hrs	$ 1.58	$ 1.51	$ 1.65	$ 1.79	$ 1.86
1.2.1.9	Revenue per hour from cars parked 2 days	$ 1.18	$ 1.09	$ 1.17	$ 1.26	$ 1.32
1.2.1.10	Revenue per hour from cars parked 3 days	$ 1.04	$ 0.98	$ 1.06	$ 1.14	$ 1.19
1.2.1.11	Revenue per hour from cars parked 3 days to 7 days	$ 0.77	$ 0.73	$ 0.81	$ 1.07	$ 1.12
1.2.1.12	Revenue per hour from cars parked more than 7 days	$ 0.47	$ 0.46	$ 0.53	$ 0.83	$ 0.76
1.2.2.1	% of total exits of cars parked less than 30 min	15.68%	15.89%	18.21%	20.24%	19.35%
1.2.2.2	% of total exits of cars parked 1 hr	23.99%	23.06%	22.57%	22.31%	22.65%
1.2.2.3	% of total exits of cars parked 1hr to 1.5 hrs	15.67%	15.37%	13.82%	12.17%	12.24%
1.2.2.4	% of total exits of cars parked 1.5 hrs to 2 hrs	7.54%	7.58%	6.50%	5.15%	5.15%
1.2.2.5	% of total exits of cars parked 3 hrs	5.15%	5.33%	4.45%	3.23%	3.12%
1.2.2.6	% of total exits of cars parked 4 hrs	1.47%	1.53%	1.26%	0.87%	0.80%
1.2.2.7	% of total exits of cars parked 4hrs to 7 hrs	1.40%	1.55%	1.52%	1.40%	1.11%
1.2.2.8	% of total exits of cars parked 7hrs to 24 hrs	8.91%	9.12%	9.99%	11.24%	11.37%
1.2.2.9	% of total exits of cars parked 2 days	6.77%	6.51%	7.52%	8.44%	8.67%
1.2.2.10	% of total exits of cars parked 3 days	5.10%	5.11%	5.44%	6.03%	6.22%
1.2.2.11	% of total exits of cars parked 3 days to 7 days	6.93%	7.31%	7.31%	7.87%	8.23%
1.2.2.12	% of total exits of cars parked more than 7 days	1.38%	1.64%	1.41%	1.05%	1.08%
	Weighted revenue per hour	5.66	5.11	4.40	4.20	4.44
	Normalized PSV Score	1.19	1.07	0.92	0.88	0.93
	Deviation in % from average score	19%	7%	-8%	-12%	-7%
1.3	**Minimize Damage claims Resulting in Losses**					
	% claims denied	0.67	0.70	1.00	0.75	0.88
	Normalized PSV Score	0.84	0.88	1.25	0.94	1.10
	Deviation in % from average score	-16%	-12%	25%	-6%	10%

Exhibit 9

		2000	2001	2002	2003	2004
2	**Maximize Reliabilty of Services**					
	Normalized Outcome Score	1.19	0.93	0.46	1.64	0.78
	Deviation in % from average score	19%	-7%	-54%	64%	-22%
2.1	**Minimize Parking Gap**					
	Average annual daily parking gap	37.28	73.33	691.61	20.67	132.81
	Inverse average annual daily parking gap	0.03	0.01	0.00	0.05	0.01
	Normalized PSV Score	1.37	0.70	0.07	2.47	0.38
	Deviation in % from average score	37%	-30%	-93%	147%	-62%
2.2	**Minimize Parking Lot Closures**					
	Annual closures	148.99	147.33	204	146.00	149.00
	Normalized PSV Score (inverse)	1.05	1.06	0.77	1.07	1.05
	Deviation in % from average score	5%	6%	-23%	7%	5%
2.3	**Minimize Length of Closures**					
	Average annual length of closure	0.32	0.32	0.54	0.32	0.34
	Normalized PSV Score (inverse)	1.09	1.11	0.66	1.11	1.03
	Deviation in % from average score	9%	11%	-34%	11%	3%

		2000	2001	2002	2003	2004
3	**Maximize Responsivness to Customers**					
	Normalized Outcome Score	1.26	0.85	1.00	1.04	0.85
	Deviation in % from average score	26%	-15%	0%	4%	-15%
3.1	**Minimize Cutomers' Concern About Parking**					
	% of passengers who considered parking as a great concern (inverse)	7.05%	5.88%	7.71%	4.55%	7.69%
	Normalized PSV Score	0.99	1.01	0.99	1.02	0.99
	Deviation in % from average score	-1%	1%	-1%	2%	-1%
3.2	**Minimize Bad Experiences Due toParking**					
	% of passengers who had a bad experience and said parking was a great concern (inverse)	0.04	0.03	3.03%	4.49%	4.05%
	Normalized PSV Score	1.00	1.00	1.01	0.99	1.00
	Deviation in % from average score	0%	0%	1%	-1%	0%
3.3	**Minimize Damage Claims**					
	Annual damage claims	3.00	10.00	3.00	4.00	8.00
	Inverse annual damage claims per annual exits	358,561	106,079	203,109	222,090	115,167
	Normalized PSV Score	1.78	0.53	1.01	1.10	0.57
	Deviation in % from average score	78%	-47%	1%	10%	-43%